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Indiana Native Plant Society

Winter 2020-21

Invasive Plant Profile

Siberian Squill (*Scilla siberica*): Beauty or Beast?

By Richard Smith

It's January and while kicking up some leaf litter in our woods, I notice the first green tips of leaves emerging. These leaves are the harbinger of the beauty and horror to come. Siberian squill or scilla (*Scilla siberica*, family Asparagaceae). I first became aware of the invasive quality of Siberian squill in 2015 after noticing its spread from our yard deep into our woodland.

Siberian squill is a perennial monocot from Eurasia. It winters as a bulb, forming basal leaves that emerge in mid-winter (late January in Wayne County USDA zone 5b) and flowering from late February through mid-April. The leaves are approximately 4" long at the end of March and 6" long on full maturity. The blue/purple flowers with 6 tepals and 6 separate stamens are arrayed in clusters of 1-3 flowers (Illinois Wildflowers, 2020).

The flower is visited by at least one pollinator – honey bees (Wilhelm & Rericha, 2017). After pollination, most flowers fade to white with light blue stripes. Upon forming seedpods, the stems that support seedpods droop to the ground, the leaves gradually diminish, and the plant goes dormant. Dissection of the trilobed seedpods indicates that there are usually 18 seeds per seedpod, six per lobe. Dispersal and propagation appear to be primarily from seed dispersal, although *Scilla* does form bulblets that mature in 2-5 years. The seeds require a period of freezing temperatures before they can germinate. Because of Siberian squill's early emergence, it dominates its immediate environment during late winter to mid-spring. In a dense infestation, there are well over 300 plants (including hollow-leaved seedlings) per square yard.

I have observed Siberian squill in a variety of habitats: forest, flower gardens, and lawn turf. It does not appear to thrive in marshy spots nor compacted soils. It also does not appear to compete as successfully in lawns as in forests.

If seed dispersal is the primary source of the spread of Siberian squill, then how does that

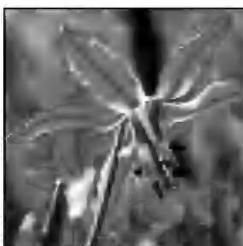
dispersal occur? My observation is that isolated patches appear more frequently on human and deer trails. Since seeds are not wind dispersed, dispersal via hooves, paws, boots, and tires are the most likely causes.

Siberian squill has become a successful invasive for several reasons. Its early emergence reduces competition from other species. In a woodland setting, it is protected from herbicides

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from Brecks.com



Paul Rothrock



Above: The flower of Siberian squill has rich blue tepals and long separate stamens.

Below: Glory-of-snow, *Chionodoxa forbesii*, looks similar to *Scilla siberica* but its upward facing flowers have a corona formed by the short stamens. It too may be a woodland invasive.

for much of its growing season by leaf litter. Because of its somewhat waxy leaf surface, early surface application of herbicides is not predictably productive. There do not appear to be any natural predators that I have observed. In fact, the plants contain anti-mammalian toxins (Illinois Wildflowers, 2020).

In garden and wildflower blogs, there is an active debate about the invasiveness of Siberian squill (Minnesota Wildflowers, 2020). Opponents argue that it crowds out other native spring ephemeral species while its proponents maintain that because the foliage is gone by mid-spring, it does not "crowd out" other species.

To test for possible crowding-out effect, I conducted a small study based upon four 15'x15' randomly positioned (i.e., using a frisbee toss) plots. Plots A and B were approximately 50' apart and about 150 yards from Plots C and D that were approximately 15' apart. For consistency, all plots were on north-facing slopes with a mature tree canopy. Plots C and D were densely packed with *Scilla*. In order not to disturb emerging plants and to facilitate counting of plants, leaf litter was

Squill – continued on next page

Squill – continued from page 1

removed from all four plots on March 10, 2019. Native plants were counted on April 16, 2019. No effort was made to count individual plants when there were more than 20 plants of one species.

Plot A (no *Scilla* infestation) contained more than 20 individual plants of the following species: large-flowered bellwort (*Uvularia grandiflora*),

cut-leaf toothwort (*Cardamine concatenata*), mayapple (*Podophyllum peltatum*), ramps (*Allium tricoccum*), and spring beauty (*Claytonia virginica*). In addition, there were five red trillium (*Trillium sessile*) plants.

Plot B (no *Scilla* infestation) contained more

than 20 individual plants of the following species: cut-leaf toothwort, Dutchman's breeches (*Dicentra cucullaria*), mayapple, ramps, Solomon's seal (*Polygonatum* sp.), and spring beauty. In addition, there were two bloodroot (*Sanguinaria canadensis*) plants.

Plot C (*Scilla* infested) contained more than 20 mayapple plants, 2 bellwort plants, and 1 bedstraw (*Galium* sp.) plant.

Plot D (*Scilla* infested) contained no plants other than *Scilla*.

Given these limited observations, it seems likely that a Siberian squill infestation suppresses early-flowering native plants. Ironically, *Scilla siberica* was awarded the Royal Horticultural Society's Award of Merit in 1993 (Dashwood & Mathew, 2005).

For several years I tried to control Siberian squill with sporadic herbicide application with a squeeze-type hand sprayer. Since internet searches yielded little useful information on controlling *Scilla*, I decided to try more systematic approaches on various control methods. In my short experience, control of Siberian squill is apt to be more intensive, more long-term, and less successful than control of

other herbaceous invasive plants in Indiana such as garlic-mustard (*Alliaria petiolata*) or dame's rocket (*Hesperis matronalis*). Having said that, I believe that long-term treatment resulting in local control is a possibility (disappointingly, not a firm likelihood). Due to its density (see image at left), mechanical removal is an option only for small isolated patches. Early spring application (mid-March) of glyphosate (5%) with a surfactant is highly dependent on ambient air temperature and is notably less effective than late (April) herbicide applications. Late herbicide application, i.e., early April, has the advantage of better foliage absorption but has the disadvantage of the overspray negatively affecting native plants. Spot spraying of isolated individual plants and patches may reduce the spread of plants to the point where mechanical removal is feasible. Regrettably, none of these have yet proven to be long-term controls in my woodlands. Future research should determine how long Siberian squill seed remains viable in the seed bank. But in the meantime, it clearly would help to prevent seed set where possible and halt their addition to the soil. Certainly mechanical removal of blooms by low mower heights or weed eater should be practiced in lawn turf or on groomed trails.

I hope my experience with this beautiful beast provides an early warning to my fellow Indiana gardeners and stimulates more experiments and public exchanges on how to control invasive *Scilla*.

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Richard Smith is retired and lives in Wayne County, Indiana.

Richard Smith



Above: A woodland infested with Siberian squill.

Below: An excavated individual of Siberian squill showing its bulb and developing seedpods.

Botany Basics

Simple Stratification of Native Plant Seeds

By Gregory P. Gordon

Many native seeds need a period of cold treatment to mimic nature where seeds are in the ground throughout the winter and sprout once the soil warms. I tried winter sowing seeds in pots and raised beds where I knew moisture and drainage would be adequate. After several years of trying with a variety of different native seeds and almost none of them ever sprouting, it was time to try something different.

Some experts recommend mixing seeds and damp sand, putting them in a baggie and placing them in the refrigerator for a couple months. It turns out, my wife has pretty strong feelings about baggies of sand and seeds in her refrigerator, especially given my enthusiasm. So I was pretty excited when I learned about the milk jug method.

Most species that require cold stratification need at least 4-6 weeks of treatment. During the period from late December through February in Indiana you take a milk jug and punch or drill several drain holes in the bottom. Then cut the jug around its middle but leave an inch or two uncut. This uncut section acts a hinge holding the two halves together. Fill the jug with a good drainage sterile seed-starting medium to just below the cut line. Moisten it thoroughly. Spread your seeds across the soil and cover them with $\frac{1}{4}$ inch of moistened medium. Tiny seeds (e.g. the lobelias) can be cast on the surface. Next wrap furnace tape around the cut to reseal the container. Leave the lid off and place outside where it will not be in the sun and will receive rain and snow. Also take care that it won't be blown over by the wind. If potting soil looks dry, it is important to water with cool water.

After 6-10 weeks bring the jug into a heated location to trick the seeds into thinking spring has arrived. As many of you know many natives won't sprout till the ground temperature reaches a certain temperature, usually between 70-80° F. It is advisable to look up the specific requirements of the seeds you wish to raise. I recommend the Prairie Moon website (<https://www.prairiemoon.com>) and Williams (1985). While a greenhouse is ideal, I use my furnace room outfitted with fluorescent lights on racks. Do not let the soil dry out! Once plants begin sprouting make sure they have good light, but leave the container closed until they are large

enough to transplant into cell packs or small pots. By March (in southern Indiana) you can even put the transplants outside where the humidity is higher than in the house.

In my third year of using this method I have successfully raised many

natives from seeds obtained at the INPS Conference Seed Swap, gathered in the wild, or harvested from friends' plants. These include several species of milkweeds (*Asclepias*), goldenrods (*Solidago*), sedges (*Carex*), and lobelias (*Lobelia*) as well as buttonbush (*Cephalanthus occidentalis*), beautyberry (*Callicarpa americana*), anise hyssop (*Agastache foeniculum*), nodding onion (*Allium cernuum*), royal catchfly (*Silene regia*), and mountain mint (*Pycnanthemum*).

I have also trended away from milk jugs to juice containers, 2 liter Coke bottles, and even small water bottles. These take up less room and usually hold more than enough seeds for my purposes, which includes a native plant sale by our local chapter, INPS-SW.

References:

Williams, H.R. 1985. *Growing and Propagating Wild Flowers*. The University of North Carolina Press.

Gregory Gordon is a Master Naturalist and Master Gardener and a semi-retired psychotherapist. He has taught several propagation classes for SW Indiana Master Gardeners Association and serves as the Plant Sale co-chair for INPS-SW.

Editor's Note:

Last issue of INPS Journal was incorrectly labeled as Volume 28, Number 2. Fall 2020 is actually Volume 27, Number 2.



Susie Gordon

Gregory displaying some of the germination jugs and holding one of his many successes.

Native or Non-native? That is the Question

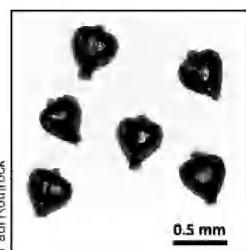
The Discovery of *Eleocharis atropurpurea* in Indiana

By Nathanael Pilla

A "belly view" of purple spikerush. This diminutive plant lacks obvious leaves and bears a single spike at the tip of fertile shoots.



Nathanael Pilla



Paul Rothrock

The black fruits of *E. atropurpurea*, needed for positive ID, are remarkably tiny; recall that 0.5 mm = 0.02 inches.

native distribution, habitat, associated species, and even size. *Eleocharis atropurpurea* is a primarily western pond shore species distributed in both temperate and tropical climates globally (Reznicek, 1994; Svenson, 1929). It is an annual that has tiny black achene fruits at 0.5 mm long and grows a mere 3-12 cm tall (Svenson, 1929), that's approximately 1-4 inches in the non-metric US. It has quite a wide but scattered distribution, from California to Florida and north to Michigan (Kartesz, 2015). Within the Midwest it occurs in five states, being considered a species of conservation concern in each. There are four occurrences in Michigan (where it is ranked as critically imperiled), three counties in Iowa, and three counties in Missouri; yet it is not known from Illinois, Ohio, Wisconsin, or Minnesota. The Michigan population is quite disjunct from its known range, with the nearest populations being in southeast Iowa (Consortium of Midwest Herbaria, 2020).

Indiana would thus help fill the gap between the native disjunct populations. Michigan's populations occur within acidic coastal sand

On July 10, 2020, three botanists and connoisseurs of fine beverages, Bradford Slaughter, Doug Botka, and myself, discovered a species new to the Indiana flora, the purple spikerush (*Eleocharis atropurpurea*), which is in fact not a rush at all but a sedge. After this discovery, the author found it again a week later at another site about 7.5 miles from the first site in a similar habitat. Indiana State Botanist Scott Namestnik, after being told of the discovery, found a third population in a similar habitat in an adjacent county. While all this was exciting for everyone involved, the question, "If it is new to Indiana, why do you consider this a native species?" came up often. So why is this new find a native and not an introduced species?

When discovering a species new to a given region, many factors are assessed including but not limited to

plains linked with water fluctuation, where it can grow in large numbers (Reznicek, 1994). The Indiana discoveries were all in this rather special habitat as well. The habitat was not only similar to that in Michigan, but the associated species also matched with other sites in the Midwest, including the rare Hall's bulrush (*Schoenoplectiella hallii*) and native Drummond's halfchaff sedge (*Lipocarpha drummondii*).

This begs the next question, if it has been here the whole time, how is it that no botanist has seen it before? One hypothesis could be its size and annual temperament. Little is published on the germination triggers of purple spikerush; however, it is assumed that it does not appear every year and could potentially sit in the soil's seed bank in anticipation of optimal environmental conditions. Perhaps its germination cues are similar to those of Hall's bulrush mentioned in the accompanying article by Paul Rothrock on the next page. Furthermore, even with its often large population sizes, it is easy to miss as it usually stands under and among a plethora of other little sedges such as slender fimbry (*Fimbristylis autumnalis*) and other similar looking *Eleocharis* species. Anecdotally, it was not until I knelt to look at the larger Engelmann's spikerush (*E. engelmannii*) that I found the tiny sedge which carpeted the ground.

There is accurate perception that spikerushes are hard to identify thus becoming easily passed over by the untrained or even the trained eye. It is true that spikerushes are typically quite ambiguous relative to surrounding vegetation. Sometimes, though; all it takes is seeing it once to provide the all important search image. After the initial discoveries, I found I had completely overlooked purple spikerush from a site that I had previously "botanized." Now with that search image, I expect several of us will spot more populations in similar habitats in Indiana and potentially in Illinois as well and begin to gain a full understanding of the true level of rarity of this intriguing plant.

And so, now that I have introduced my plant friend, purple spikerush, please welcome it as a native Hoosier.

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Seed Dormancy: A Watchful Sleep

By Paul Rothrock

"To hold a seed in the palm of the hand is to hold a small future that is impossible to predict. Is the seed alive or is it dead? Will it germinate if it is given water, or is it dormant? The seed could be in any of these conditions and the internal mechanisms that determine which actually pertains is one of the great biological enigmas remaining to be unravelled by today's plant scientists."¹

In light of this quote from an anonymous English horticulturist, imagine holding a seed in your hand that is 2,000 years old. The oldest mature seed that has grown into a viable plant was an ancient Judean date palm (*Phoenix dactylifera*) seed recovered from excavations at Herod the Great's palace on Masada in Israel (Sallon et al., 2008). Talk about an impossible future to have predicted but also the amazement that, under the right conditions, its dormancy could be broken successfully and the pent up genetic potential of that seed released 2,000 years later.

Right now I have a variety of native wildflower seeds that I have collected and want to germinate for my 2021 garden. What dormancy barriers do they contain and how may I overcome them in a timely fashion? The article in this issue of INPS Journal by Greg Gordon (see p. 3) provides the most basic approach to the problem, namely cold stratification² of seeds either in your refrigerator or in safe conditions out-of-doors. But to better understand seed dormancy let's turn to the premier experts, Jerry and Carol Baskin, who spent a lifetime at the University of Kentucky studying the patterns of seed dormancy and germination.

The Baskin's (2004) define a living but dormant

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(BONAP). 2015. Taxonomic Data Center. (<http://www.bonap.net/tdc>). Chapel Hill, N.C. [maps generated from Kartesz, J.T. Floristic Synthesis of North America, Version 1.0. Biota of North America Program (BONAP). Accessed 20 Oct. 2020.]

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seed as one that does not have the capacity to germinate successfully even under conditions that otherwise are favorable for its germination. Given the passive behavior of plants, they distribute their seeds into the vagaries of their environment and seem to "hope for the best." But miraculously the seed's genetic code and resulting physiology prevents germination if poor growing conditions are likely (e.g., winter for many species) and release the seed for germination if the probabilities for success are high (spring for most species). To achieve this result, plants may draw upon five broad strategies of dormancy, but the most common type is physiological dormancy.

In physiological dormancy a biochemical interplay (involving abscisic acid and DOG1 protein) conditions the readiness to germinate while other hormones (e.g., gibberellins and ethylene) ultimately trigger germination. The seed's biochemistry changes with the age of the seed, temperatures of the soil, and the presence versus absence of light. This means that the seed must possess an ongoing interaction with the soil environment even while dormant. In other words seeds are "watchfully asleep."

In many Indiana plant species, before the onset of winter, dormant seeds either will not germinate or will do so only under highly specific conditions. Dormancy weakens during the course of winter until the temperatures suitable for germination have become broad. These conditionally dormant seeds now await a final environmental cue such as light to launch germination.

One of the important discoveries by the Baskin's (1984) is that seeds may go through an annual dormancy cycle. So a century old seed of common ragweed (*Ambrosia artemisiifolia*) has gone through the cycle 100 times. Each spring there is a readiness to germinate (conditional dormancy). A seed will germinate if the soil is moist and it senses sufficient light to indicate that it is not buried deeply in the soil. If temperatures continue to warm and the trigger of light does not come, the seed reenters a phase of deep dormancy, until the next spring rolls around.

Substitute *Eleocharis atropurpurea* for common ragweed and this dormancy cycle provides some insight into Nathanael Pilla's discovery of the tiny sedge in Indiana, reported in this issue of INPS Journal (see p. 4). The seeds of

**Botany
Basics**

Dormancy — continued on page 7

A Favorite Book for Winter: “The Essential Aldo Leopold: Quotations and Commentaries”

edited by Curt Meine and Richard L. Knight

By Lee Casebere

Most folks know Aldo Leopold as the author of “A Sand County Almanac” (ASCA), a timeless natural history and conservation narrative centering around the concept of a land ethic. The wisdom embedded in ASCA holds up just as well today as it did in 1949 when published. Its easy to read and often eloquent style contains dozens of quotable gems regarding conservation and environmental matters. Not surprising then that this book is to this day required reading in many environmental science courses. So, clearly, if you are not familiar with Aldo Leopold or have never read ASCA, you must begin there.

Over the past 70 years there have been many books written about Leopold and his significant writings. I've read many of those books and would recommend most. But if I am to choose a second Leopold book for your conservation classics library it would be “The Essential Aldo Leopold” (TEAL) published in 1999.

Leopold lived from 1887 to 1948, dying at age 61 only months before ASCA, the book that made him famous, was published. His formative years were during a time of monumental change in the American landscape during which the industrial revolution, population expansion and settlement, and natural resource utilization were all plowing forward full speed ahead. Following graduation from Yale University's pioneering School of Forestry, his first employment

experiences were in field and administrative positions in national forests in Arizona and New Mexico. There he experienced first-hand the severe erosion and loss of water resources related to years of overgrazing.

In later years he made a name for himself at the University of Wisconsin by starting what is considered the first university wildlife management program in the nation. His interests in ecology and wildlife research blossomed during his UW years. He bought a worn-out farm in the sand country near Madison where he and his family spent many years staying at the famous “shack” on weekends and experimenting with habitat restoration. Events from their time at the shack became the focus of many of his natural history narratives in ASCA. Leopold was ahead of his time in recognizing the stabilizing power of natural diversity. And due to their qualities as reservoirs of natural diversity, he was a strong proponent of preserving wilderness and remnant natural areas wherever they occurred.

Leopold had strong opinions about these and many other topics, and he wrote about them throughout his life. Many of his writings were essentially unknown and/or unpublished during his lifetime but were discovered later by Leopold scholars and biographers. TEAL has taken his writings from multiple sources (including ASCA) and brought them together into subject-focused categories.

The book's arrangement is in three broad categories: 1) Conservation Science and Practice, 2) Conservation Policy, and 3) Conservation and Culture. In each of these categories there are several sub-topics. Each sub-topic is introduced by an expert in that aspect of Leopold's writings. These individuals are clearly intellectual descendants of Leopold, and their words emphasize the enormous influence Leopold has had in ecological and conservation disciplines.

In total there are twenty-one of these sub-topics displaying the wide range of knowledge and opinion held by this conservation pioneer. Included among the sub-topics are forest ecology and management, range ecology and management, agriculture, wilderness, ecological restoration, biodiversity and conservation biology, private land, public land, economics,

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Book Review



“We end, I think, at what might be called the standard paradox of the twentieth century: our tools are better than we are, and grow better faster than we do. They suffice to crack the atom, to command the tides. But they do not suffice for the oldest task in human history: to live on a piece of land without spoiling it.”

— Aldo Leopold

Dormancy – continued from page 5

Eleocharis may have remained for many years in the soil. When he spotted it this past May likely only a small proportion of the reservoir of seeds had germinated, the remainder returned to their deep dormancy to await another good year. What was particularly exciting about his discovery was that another rare wetland sedge, Hall's bulrush (*Schoenoplectiella hallii*) grows at one of his *Eleocharis* sites. The Baskin's (Baskin et al., 2003) studied the specific dormancy and germination behavior of this species and discovered a remarkably complex reading of the soil environment. Seeds of Hall's bulrush require a period of cold and damp but not flooded conditions. To finally stir germination, however,

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hunting and fishing, arts and sciences, and others. The individual excerpts range from a single sentence to two or three paragraphs with most being just a single paragraph, thus they are snippets. As such, they lack the flow and continuity that one would find in the writings from which they came. But when grouped together, they successfully place emphasis on his broad knowledge and concern about conservation matters. Although they represent many distinct ideas, taken collectively they possess coherence much like the interconnectedness inherent in the natural diversity concepts so dear to him.

The dedication in the front of the book is "To the descendants of Aldo Leopold – familial and intellectual." As one among the long line of Leopold disciples, I deeply enjoy this book; it adds a different way of seeing his words and influences. During a dreary winter's day, curl up with it in your favorite cozy spot and let the wisdom of his land ethic recenter and reconnect you.

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Lee Casebere, a retired ecologist from IDNR's Division of Nature Preserves, has spearheaded the INPS Photo Contest and is a member of the Central Chapter.

they need spring flooding that boosts the concentration of ethylene in the soil; then presto, a burst of germination.

While simple stratification will allow most species to break out of physiological dormancy, some species prove more challenging. Those with thick seed coats (e.g., Kentucky coffeetree, *Gymnocladus dioicus*) benefit from scarification in which sandpaper is used to abrade the seed. Some prairie species (e.g., lead plant, *Amorpha canescens*) may benefit from a soak in hot (i.e., recently boiled) water, while others (e.g., partridge-pea, *Chamaecrista nictitans*) benefit from heat as if exposed to fire (Martin et al., 1975). One readily available resource for germination tips for many native species may be found at the Prairie Moon website (<https://www.prairiemoon.com/blog/resources-and-information/how-to-germinate-native-seeds>).

While it is not likely that my 2021 seed stock will survive 2000 years of "watchful sleep," do take time to marvel with me that these tiny genetic parcels have used their complex dormancies to regenerate, year after year, our rich Indiana flora!

¹ <https://www.cotswoldseeds.com/articles/180/the-miracle-of-seeds>. Accessed September 2020.

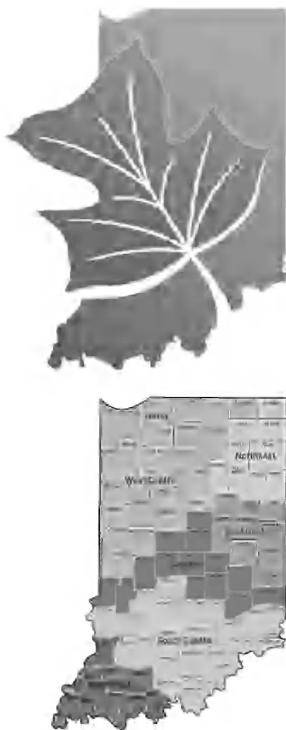
² Seed stratification is defined as simulating natural conditions that the seeds must experience before germination can occur.

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Share online: Send information for posting to webmaster@indiananativeplants.org.

Annual Meeting Brings Members Together Virtually

For the first time, the INPS held its annual meeting virtually due to the pandemic. Instead of a day long in-person conference, a two-hour meeting was held to share information on native plants, as well as INPS activities this year and plans for next. Our thank you to Indiana University – Department of Biology, which provided the facilities and internet connection to host this large meeting with 211 attendees.

INPS President Ellen Jacquot started with a summary of the year, recognizing the cancellation of the Native Plant Sale and Auction and the in-person Annual Conference, but noting other initiatives that went forward, including the Florathon, the Photo Contest, and many Chapter events. She shared that the Council has been expanded to include a Diversity Committee, chaired by Brooke Alford and Coralie Palmer. Their role is to actively seek to expand our reach to new audiences. Also added was a Student Council member to help INPS connect with younger audiences. Caitlin Osburn, a 4th year Landscape Architecture student with a minor in wildlife biology with an emphasis in botany at Ball State University was selected to fill this position.

Coming in 2021 is a state-wide photographic scavenger hunt announced by Paul Rothrock (<https://indiananativeplants.org/2020/coming-in-2021-photographic-scavenger-hunt/>). Plant photos are needed to populate the midwestherbaria.org website and for the INPS photo library.

Ellen then introduced the slate of Board nominees for 2021. The attendees of the meeting voted unanimously through a Zoom poll to elect Directors Ellen Jacquot, Ronnie Greenberg, Roger Hedge, Don Gorney, and Greg Shaner.

Next, Barb Homoya revealed the winners of the Florathon, including the winners of the Audrey II traveling trophy for the greatest number of species in bloom in a 24-hour period. That honor went to the Always Be Botanizing team made up of Barb, Mike, and Wes Homoya.

Lee Casebere announced and shared the winning photos from the INPS Photo Contest to the great appreciation of the audience, as the photos were truly stunning. See the results at <https://indiananativeplants.org/inps-sponsored-events/2020-photo-contest/>.

Ellen shared an update from Dawn Slack, Invasive Education Chair, on the bad year experienced by invasive plants in Indiana in 2020. This included the banning of 44 highly invasive species from sale and the creation of A Guide to the Regulated Terrestrial Invasive Plant Species of Indiana (available at <https://drive.google.com/file/d/1XWtXDIrBKAd486-uxcExB0YawlzBixVX/view?usp=sharing>).

There also have been 27 Cooperative Invasive Species Management Areas (CISMAS, groups that work on invasive species issues at the local level) established in Indiana, with 9 more starting to organize, through the Indiana Invasives Initiative, which Dawn coordinates.

Finally, Ellen shared her 20 favorite places to find native plants in Indiana, five sites for each season. That show is available at <https://indiananativeplants.org/wp-content/uploads/The-Best-Places-to-Find-Native-Plants-in-Indiana.pdf>.

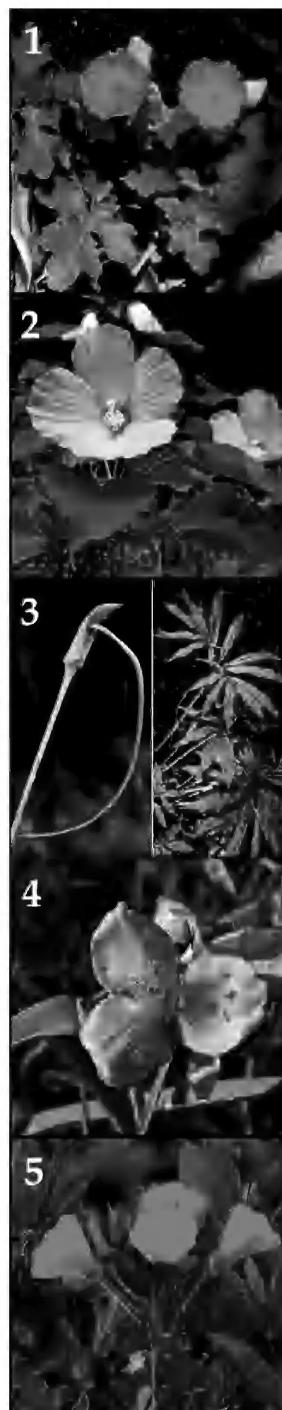
Throughout the meeting, Mark Sheehan challenged attendees with native plant trivia questions. The first one to answer correctly in the chat box won native wildflower seeds donated by Cardno Native Plant Nursery and five attendees were awarded seeds for their answers.

For those who missed it, the Annual Meeting was recorded and is at <https://www.youtube.com/watch?v=lRdz3jmdhxc>.

A Shout-Out to Two of Our Own

Two INPS members, Nancy Hill and Wendy Ford, served as Midwest experts for an article in "Fine Gardening" magazine (December 2020 issue; <https://www.finegardening.com/article/best-natives-for-midwest>). They highlighted five native perennials as standouts for your landscape and, given the pros that they are, gave tips for growing conditions and suggestions for their use. Congratulations to Nancy and Wendy and a note of thanks since they promoted Indiana Native Plant Society in their bio's as well as INPS "Buy Natives Directory" (<https://indiananativeplants.org/landscaping/where-to-buy/>)

To the right are pictures of their recommendations. See how many you can identify. Answers are on page 15.



1 to 4 by Paul Rothrock

Brian Wood

Nativars: Should Gardeners Use Cultivars of

1. The Perplexed Gardener

By Nancy Hill

Am I Making the Right Plant Choices?

I love the birds, butterflies, and moths that native plants attract to my urban gardens and watch them all summer long. I don't use any chemicals or spray for insect control. But lately I've been puzzling over whether I've made the right plant choices for them.

I've been a gardener and a native plant lover for a long time. In my gardens, I have native Midwestern species such as Virginia bluebells (*Mertensia virginica*), sundrops (*Oenothera* spp.), sweet-bay (*Magnolia virginiana*), rough-leaf dogwood (*Cornus drummondii*), and vernal witchhazel (*Hamamelis vernalis*). I also have total non-natives like hosta (*Hosta* spp.), spiraea (*Spiraea* spp.), and Japanese painted fern (*Anisocampium niponicum*). And I have



Walter Garden and PerennialResources.com

The nativar *Liatris spicata 'Kobold'* has several desirable horticultural traits: it is stockier and of more uniform height than the wild type.

Artificial Selection - The process by which humans choose which plants will sexually reproduce and have offspring together.

Cultivar - Plant artificially selected by a grower for certain traits such as height, leaf color, vigor, compactness, and propagated to keep those traits. The cultivar name will include a descriptive phrase in single quotes, such as *Hosta 'Empress Wu'*.

Nativar - Cultivar of a native plant. For example, *Hibiscus moscheutos 'Luna Red'* has burgundy-red flowers (those of the straight species are pink or white) and is more compact than the straight species. Most of the native plants sold in garden centers are nativars.

Hybrid - Usually refers to an intentional cross-pollinating between two species, sub-species, or varieties to enhance certain traits. The resulting offspring are denoted by a "*" in the plant name. For example, *Hamamelis × Intermedia 'Arnold Promise'* is a cross between Chinese and Japanese witch hazels (*Hamamelis mollis* and *Hamamelis japonica*). Natural, spontaneous hybrids also occur. It is thus possible for a nativar to cross with wild-type individuals, yielding hybrids that modify the genetic diversity of the straight species.

lots and lots of nativars – cultivars of native species. They form the backbone of my gardens.

My plant choices are ones any gardener might make. For example, the species *Hydrangea arborescens* that I see in our Owen County woods are beautiful but rangy and have small flower heads. Though not a fan of the pink and blue snowball hydrangeas that I remember from my grandmother's garden – they seem too exotic – I do love the nativar *Hydrangea arborescens 'Annabelle'*. Mine bloom nearly all summer, starting with a stunning soft chartreuse and eventual pure white. They are a great cut flower and the foliage stays nice all season.

And so a patch that I call my native forb garden is not native in the purest sense. It has *Helopsis 'Summer Sun'*, *Liatris spicata 'Kobold'*, *Tradescantia 'Zwanenberg'* and *Phlox paniculata 'Bright Eyes'*. I know that my nativars attract pollinators, but they may not be host plants. And herein lies the quandary.

Am I cheating nature by not using just straight species?

Nancy Hill is an avid, discerning gardener in both city and country Indiana. A past president of INPS, she also has organized INPS conferences and helped develop our popular brochure, Landscaping with Plants Native to Indiana.

2. The Practical Gardener

By Jo Ellen Meyers Sharp

Is That Native Plant Garden Worthy?

I hadn't been gardening for very long when the Indiana Native Plant and Wildflower Society (now Indiana Native Plant Society) was founded. In those early years, Bill Brink and Carolyn Harsted talked to me several times about including native plants in my *Indianapolis Star* columns. Bill called me out when I (unwittingly) wrote about an invasive species, and each encouraged me to plant natives in my garden.

Confession. I'm too much of a plant geek to only use native plants in my landscape. But I took Bill and Carolyn's advice and planted natives and wrote about them.

I started with a straight species of goldenrod (*Solidago* sp.). I don't remember which one, except it was billed as a native that attracted pollinators and bloomed in late summer and early

Native Plant Species? Three Perspectives

fall. All of that was true, but in my garden, it was a 6-foot tall plant swaying with powdery mildew. It didn't even bloom all that great, either.

What I learned is that not all native plants are garden worthy. Which brings us to what are called nativars, the named hybrids and selections of our native plants. For the goldenrod example, think 'Fireworks' (*S. rugosa*), a lovely plant with all of the attributes we want, including a draw for butterflies in late summer.

Many of these beauties have a place in our gardens of native plants. Many nativars have improved attributes, such as reduced size, disease and insect resistance, more flowers, larger flowers, better form, more winter or summer hardy, neater, longer bloom time and other assets gardeners appreciate in plants.

Also on the plus side – the introduction of nativars has dispelled the notion among many gardeners that native plants are weedy.

I've wanted a buttonbush (*Cephalanthus occidentalis*) for a long time, but knew it would not work in my yard because of the size of the species. I liked the flowers, seed heads, form, and its support of insects. A few years ago, Proven Winners ColorChoice Flowering Shrubs and Bailey Nurseries' First Edition brands introduced two dwarf buttonbushes and I got to trial them.

Proven Winners' Sugar Shack (*C. o. 'SMCOSS'*) and First Edition's Fiber Optics (*C. o. 'Bailoptics'*) were excellent plants in the 4 foot tall and wide range. They had the same ball flowers but on a downsized form. The pollinators loved the flowers. I got to put a nativar in my landscape when I could not accommodate the straight species.

Jo Ellen Meyers Sharp (hoosiergardener.com), president of GardenComm: Garden Communicators International, has been writing about gardening for 30 years. She trials about 100 plants a year. She has a free newsletter at <http://eepurl.com/gkfb91>.

3. The Ecologist

By **Coralie Palmer**

At What Cost to the Ecosystem?

Nativars: an important question indeed. From an ecological perspective I much prefer

straight native species to nativars. Nativars may be attractive for gardeners, but they can have ecological costs. They can impact the ecosystems that native plant communities support, and they can impact native plant populations themselves.

Research by Dr. Annie White at the University of Vermont shows that not all nativars are ecologically equivalent to the native species (White, 2016). Her studies indicate that the more manipulated the cultivar, the less attractive to pollinators. And where pollinators are attracted to nativars, the rewards may not be equivalent. For example, hummingbird pollinators visiting blooms of some *Lobelia* hybrids are rewarded with as little as 20% of the nectar energy found in the species, *Lobelia cardinalis* (White, 2016).

Selection for ornamental traits such as flower size, abundance, color, shape, or time of bloom can actually alter a plant's ecological role by affecting the quantity, quality, and accessibility of pollen and nectar—with double, sterile flowers, pollen and nectar may be absent altogether (White, 2016; Baisden et al., 2018).

Selection for traits such as leaf color can alter plant chemistry, potentially making the plant either unrecognizable or less valuable as a host or food source. A two-year study by Baisden et al. (2018) found that nativars with leaf color altered to red, blue, or purple showed a three- to five-fold reduction in insect herbivory, indicating reduced value for insects.

As around 90% of insect herbivores are diet or host-plant specialists, native species are crucial for ecosystem stability (Tallamy, 2019). Further research is desperately needed to determine the impact of nativars on these specialized relationships.

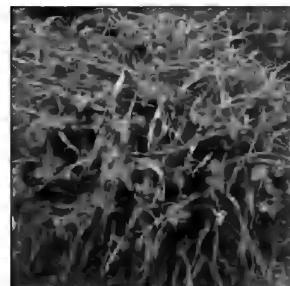
Genetic pollution is also a danger. Unintended hybridization between garden nativars and local species can introduce new genes into wild populations. This can alter competitive

Nativars – continued on page 15



Jo Ellen Meyers Sharp

The nativar Hydrangea arborescens 'Annabelle' is stunning but attracts few pollination visitors to its sterile flowers.



Walters Gardens and PerennialResource.com

Tradescantia 'Zwanenburg Blue' is a hybrid with three different parents: *T. ohiensis*, *T. subaspera*, and *T. virginiana*. According to plant nursery ads its large flowers attract butterflies; but comparative studies with wild-type individuals are lacking.

Oaklyn – continued from back page

The Journey from 2005 to Today

When Oaklyn Library opened in the spring of 2003, the disturbed grounds had been planted with a seed mix from the Indiana State Highway Department. To our great disappointment, what sprung up was mostly weeds. Clearly action was needed! In the early 2005 the library administration called in Eco Logic from Bloomington, IN.

Eco Logic used Roundup to kill everything (except little bluestem and forb plugs on the roof) and, with a no-till seed drill, sowed a quality native seed mix from Spence Nursery, Ernst Conservation, and Prairie Moon. They advised us to maintain the planting by cutting it short each fall, mowing walking paths, and starting an ongoing program to eliminate non-native plants.

Although the EVPL Maintenance Department takes care of the mowing, it became my job as branch manager to recruit and supervise

volunteers to do the weeding and deadheading. I enrolled in Master Gardener training and in 2008 became an official Master Gardener. After interacting with many MG volunteers, in 2012 the Meadow became one

plants. By and large we were successful with the 3-acre Meadow through deadheading and pulling plants, but volunteer trees became a problem. After all, left to its own devices, any given plot in southwestern Indiana would become woods!

Since EVPL does not allow us to routinely use any chemicals, my co-chair Deb Schade and I needed to gain permission to cut saplings and apply Roundup to the stumps. In our first fall (2016) we filled the two big dumpsters that the library rented for the project. Then in 2018 we asked for and received permission to judiciously use brush killer on blackberry bushes (*Rubus spp.*), poison ivy (*Toxicodendron radicans*), and other invasive plants.

Every planting has ongoing nemeses. In addition to trees, blackberry, and poison ivy, ours has at least another half dozen, including Johnson-grass (*Sorghum halepense*). The fields and roadsides near us are full of Johnson-grass, which inevitably makes its way into the Meadow. Volunteers had managed to contain but not eliminate the Johnson-grass patches, so we asked EVPL to help. They contracted with a company to treat the affected areas, and will continue that project.

The Reward of Enjoyment

Thanks to Oaklyn Meadow, the Library offers remarkable outdoor “media” in addition to the online, print, and AV media of a traditional library. The Meadow has gained further visibility through its Monarch Waystation and Natural Wildlife Habitat designations and serves as a hub for talks and tours for various organizations and the general public. In 2015 the Vanderburgh County Extension Service underwrote the cost of new signage, and the library prints a brochure that is stocked in holders on the sign. These enrich the experience of the many informal visitors to our 3 acres.

Not to overlook our Library’s Green Roof, it won the American Institute of Architects 2003 Indiana Honor Award as well as the 2004 Green Roofs for Healthy Cities North American Green Roofs of Excellence Award. The Roof and Meadow were also featured on the back cover of the nationally published book *Heart of the Community Libraries We Love*.

In the past five years the Meadow was the

– continued at right

Butterfly milkweed, a common Oaklyn Meadow species, draws numerous pollinating insects such as Fritillary (Speyeria sp.).

Paul Rothrock



Pam Locker



New England aster and sunflowers blaze with color during a September afternoon.

of 20 official SWIMGA projects. Now all those volunteer hours can count for MG credit.

INPS member Davie Sue Wallace was instrumental in the initial decision to landscape Oaklyn Library with native plants. The role of INPS became greatly enhanced after she held the organizational meeting of the Southwest Chapter of INPS at Oaklyn Library in 2012. INPS has a sustaining role as a reliable source of volunteers and good advice.

Together we work at eliminating non-native

We All Need a Little Wizardry from 2020

By Amber Slaughterbeck

It is safe to say that we have all struggled in some capacity during 2020, "The Year of the Pandemic." Nobody alive today will forget this year; however, we wish it possible. Despite the closings, the food lines, confusion of changing protocols, hardships in every family, unemployment, and the sacrifices we have all made in our daily lives ... the one constant was "nature." Nature and the great outdoors remained open, but not all of us know how to engage with the world around us. Our INPS Native Plant Wizard patch program is here to help!

"Cover your eyes, be very quiet, and listen to the sounds in the butterfly garden for about 5 minutes. Write what sounds you hear."

Taken directly from our online, printable Native Plant Wizard workbook, this is just one of the many fun, engaging activities to complete for your free patch. We didn't stop there. Every Wizard needs a teacher so we developed the Wizard Leader Manual to help guide each activity enhancing both the student's and the leader's understanding of the importance of native species.

In 2021, decide to complete our patch program with your scouts, church groups, neighborhood

→
– continued from left

subject of a 2015 presentation at the Soil and Water Conservation Society Hoosier Chapter fall meeting on "Protecting, Enhancing and Restoring Native Pollinator Habitat" held at Angel Mounds State Historic Site in Evansville, served as the location for the 2016 announcement of the Evansville Mayor's Monarch Pledge, and was one of the tour sites for the 10th Annual Eastern Native Grass Symposium in 2016.

Thanks go to INPS members and current volunteers Anne Butsch, Kate Lynch, and Mike Broz!

Once spring arrives, set your GPS to 3001 Oaklyn Drive, Evansville 47711, stop by any time, and take a stroll on the mown paths. Celebrate with us the 15th birthday of our community's Meadow.

Pam Locker is the Oaklyn Meadow Chairperson and member of the Southwest Chapter of INPS.

friends, family, etc. Nature is not closed.

Here is what to expect from our patch program:

- Actively exploring native plants helps bond youth to nature in their own locale
- Adaptable to ages 5 through 16
- Small groups of youth participate along with their adult leaders (scouts, church groups, clubs)

"It was a fun and exciting adventure." – Loretta, 9

"It was a lot of fun and I liked how it had a bunch of different topics to cover." – Nevaeh, 10

"I liked the layout of the program. The kids enjoyed the variety of activities and the questions brought about good discussions. It was helpful that it allowed for a range of ages as our group was from 5 to 10 years old. The teacher's manual was easy to follow and provided plenty of information."

– Misty Sorchevich, homeschool parent

- Focused on exploration of backyards and public lands
- Exploratory activities easily guided with the use of our Leader Manual
- Young people learn valuable lessons they can pass on to their friends and family
- Participants earn the Native Plant Wizard patch when they complete age-appropriate activities

All the materials you need to implement the program are available under the Education tab on the INPS website, www.indiananativeplants.org.

Amber Slaughterbeck is Regional Specialist for Southern Indiana Cooperative Invasives Management. She serves as a member of the Grow Indiana Natives certification team (representing west central chapter), Co-chair of the Native Plant Wizard patch program, and team member of Letha's Fund.



Naturalist Profile

Dr. Joseph Nelson Rose: Botanist

By Terri Gorney

"Kind, amiable Joseph Nelson Rose was a man of sterling qualities, willingness and patience. A great botanist and prolific writer, he never hesitated to help and encourage those who sought his advice on botanical matters." (Mitich 1981)

Few Hoosier botanists have received as much international recognition, have been as well traveled, and represented such "sterling qualities" as Joseph Rose; yet few Hoosiers have heard of him.

Rose was a fitting surname for a man who loved flowers from a young age and made botany his life's work. Joseph's great grandfather, William Rose, was an early pioneer to Union County, Indiana. Joseph was born on January 11, 1862 on a farm close to Liberty. His father George, drafted into the Civil War, unfortunately died in the battle at Vicksburg, Mississippi. (Ancestry.com, 2020)

In 1880, Rose graduated from Liberty High School and attended Wabash College. He was its first post-graduate student and received an M.S. degree in 1887 and a PhD in 1889. He served

as an assistant to Prof. John W. Coulter, an eminent botanist and student of the Cactaceae (cactus family), who directed his doctoral research on the Umbelliferae (carrot family, now known as the Apiaceae) of North America. The college would further honor Rose in 1925 with a LL.D.

Joseph Rose married Lewis "Lou" Beatrice Sims of Delphi, Indiana in the summer of 1888. Later that same year they moved to Washington, DC where he accepted the position of Assistant Botanist in the Department of Agriculture. He would remain close to his mentor, Prof. Coulter. In a letter to Walter Deane dated January 4, 1889, he mentions that "Prof. Coulter is to be with me for a month and will be here in a few days." Joseph and Lou also vacationed in Indiana that summer and spent additional time with Prof. Coulter. (BHL, 2020)

In 1896 the National Herbarium was undergoing a reorganization and transfer to the supervision of the Smithsonian Institution. Rose assumed the role of Assistant Curator and later, in 1905, Associate Curator, a position that he held until his death. He worked in a study that had beautiful large Gothic windows. I have seen a picture of his workplace in the Smithsonian, and the large

windows that were a part of the room must have been inspirational to a man who spent a lot of time in the wonders of nature.

During his long career with the Smithsonian Institution, he was responsible for securing one of its most important gifts, the renowned, private herbarium and botanical library of John Bonnell Smith of Baltimore, Maryland. Of course, Rose also published prolifically and spent research time at many of the major herbaria and botanical gardens in Europe. In this pre-digital age European travel was important for taxonomic botanists in order to study historic plant collections and especially the numerous type specimens housed there. Without doubt, though, the most significant achievement of his career was a beautifully illustrated four volume monograph on the cactus family co-authored with Nathaniel Britton. This work elevated the previously neglected and scorned family to fashionability (Mitich, 1981) and continues to be a treasured resource by cactus aficionados.

In 1893, Rose went to Yellowstone National Park to conduct a floristic study. The Park, recently put under the protection of the U.S. Army, was emerging from a formative period characterized by poaching and vandalism. Launching basic scientific research would be crucial to securing the future of the world's first national park. Rose's field notes from Yellowstone, which document those travels and some observations of plant communities, are part of the Smithsonian Institution Digital Archives (SIA, 2020). Some additional field notebooks, but not all, are online.

There are opportunities to volunteer in transcribing more of his important historical documents; check them out.

Rose's collecting trips took him not only to the American West but also the Carolinas, Florida, Cuba, Haiti, Mexico, Panama, Ecuador, and Brazil. His field and herbarium work resulted in the coining of over 3700 new plant names, especially for the Mexican flora. Some of the field books from these travels are part of the Biodiversity Heritage Library at Harvard University and also can be read online (BHL, 2020). His son George accompanied him on at least one botanical trip, to Panama in 1918. However, George's career path lay elsewhere: he later studied law and established his practice in Indianapolis.

Rose – continued at right



Joseph N. Rose in 1912
at age 50.

from Mitich 1981
<http://publicationsonline.carnegiescience.edu/>

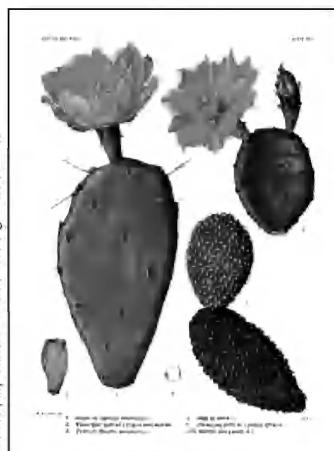


Plate 22 from Rose's
Cactaceae monograph.

The artwork by Miss
Mary Eaton depicts our
Indiana native cactus,
Opuntia cespitosa, in
the upper right.

Nativars – continued from page 11

interactions and community structure, potentially affecting the survival of fragile native populations and contributing to species extinction (Byrne et al, 2011; White, 2016).

Finally, genetic diversity within native populations is critical for adaptability and ongoing evolution, especially with increased pressures from climate change and loss of habitat. Many nativars are propagated clonally and so lack this genetic variation (Tallamy, 2019). Open-pollinated, seed grown “selections” of natives are preferable to nativars produced vegetatively, but information on nativar provenance is not widely available (White, 2016).

There are, of course, good nativars—for example, dogwood nativars resistant to dogwood anthracnose may be important for conservation (Baisden et al, 2018). But where the selection is for purely ornamental traits, the ecologist in me says straight native species are a safer ecological option. Unless you are able to carefully consider the merits and impact of each nativar, I say use straight species wherever possible.

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Coralie Palmer is a biologist, Chair of the INPS Landscaping with Natives Team, and a member of the Board of Directors of the Indiana Wildlife Federation; the Landscaping with Natives Team would be so happy to try and answer any questions at landscape@indiananativeplants.org.

Additional Resources

<https://www.ecobeneficial.com/2014/04/native-cultivars-vs-native-plants/>

<https://extension.umd.edu/hgic/topics/cultivars-native-plants>

Page 9 answers:

- 1 = celandine poppy, *Stylophorum diphyllum*
- 2 = swamp mallow, *Hibiscus moscheutos*
- 3 = green dragon, *Arisaema dracontium*
- 4 = spiderwort, *Tradescantia ohiensis*
- 5 = sundrops, *Oenothera fruticosa*

Joseph Rose studied this National Herbarium specimen from northwest Mexico 125 years ago. He determined that it was an undescribed species of jointvetch (genus *Aeschynomene*, bean family) and cited it as his “Type” specimen.

Rose – continued from left

Rose had a growing interest in the conservation of desert plants. Shortly before his death in 1928, he wrote a letter to a colleague, E. C. Rost, “I have written to a number of my friends with regards to the preservation of the cacti in southern California ... I believe that it might be possible to have set aside as a public park a section of this region.” One wonders what more he could have accomplished, what other botanical preservation efforts he could have fought for, and what discoveries he could have made if he had been granted longer than his 66 years.

It is fitting that carved into his headstone is a beautiful Scottish thistle.

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Terri Gorney is a member of INPS Northeast chapter.



from <https://naturalhistory.si.edu/research>



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The Fifteenth Birthday of Oaklyn's Native Meadow and Green Roof: Its Development, Maintenance, and Enjoyment

By Pam Locker



Pam Locker

The Meadow with mid-summer drifts of wild bergamot and gray-headed coneflower. There is a portion of the green roof visible between the wildflowers and the EVPL skylight.

grasses is evident. These include little bluestem (*Schizachyrium scoparium*), Canadian wild rye (*Elymus canadensis*), prairie dropseed (*Sporobolus heterolepis*), bluejoint grass (*Calamagrostis canadensis*), and switchgrass (*Panicum virgatum*).

The Meadow, in recent years, is a haven for bees, butterflies (including Monarchs, *Danaus plexippus*), dragonflies (from the small lake at the base of the slope), grasshoppers, curiously-shaped wasps, and other insects during the warm months. It is not unusual to stir up masses of American goldfinches (*Spinus tristis*) early and late in the day. We also discover box turtle (*Terrapene sp.*) and deer (*Odocoileus virginianus*) resting spots on a regular basis.

The Oaklyn Meadow at the Oaklyn Branch of the Evansville Vanderburgh Public Library (EVPL) system in Evansville turns 15 this year. The Meadow, with its beautiful native plants and peaceful animal life, complements the calming interior spaces of our modern library.

Since the property purchased for Oaklyn Library is steeply sloped, the architects decided to build the library into the side of the hill. They envisioned the building itself as having a green roof surrounded by a planted prairie. The vision came to life. The slope now supports a thriving 3-acre Meadow, the product of stalwart volunteers from the Southwest Chapter of INPS, the Southwestern Indiana Master Gardeners (SWIMGA), and others.

As of 2020 the site supported populations of over 30 native forbs. Early summers are graced with colorful drifts of milkweeds (especially *Asclepias tuberosa*), wild bergamot (*Monarda fistulosa*), gray-headed coneflower (*Ratibida pinnata*), and cup plant (*Silphium perfoliatum*). Later in the summer these are replaced by an abundance of Maximilian sunflower (*Helianthus maximiliani*), goldenrods (including *Solidago rigida*), and New England aster (*Sympyotrichum novae-angliae*). Throughout the season a matrix of prairie

Oaklyn – continued on page 12